<div style="text-align:center">

STUDY MODULE DESCRIPTION FORM

</div>

Name of the module/subject **Fundamentals of biomedical engineering**		Code **1010325341010326097**
Field of study **Electrical Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **2 / 4**
Elective path/specialty **Measurement Systems in Industry and**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **part-time**	

No. of hours				No. of credits **2**
Lecture: **18** Classes: **-** Laboratory: **-** Project/seminars: **-**				

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **technical sciences** Technical sciences	ECTS distribution (number and %**)** **2 100%** **2 100%**

Responsible for subject / lecturer:

Prof. dr hab. inż. Anna Cysewska-Sobusiak
email: anna.cysewska-sobusiak@put.poznan.pl
tel. 616652633
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge in the scope of electrotechnics, physics, optoelectronics, and metrology.
2	**Skills**	Ability of the efficent self-education in the area concerned with the module
3	**Social competencies**	Awareness of the necessity of competence broadening and ability to show readiness to work as a team

Assumptions and objectives of the course:

Knowledge in the scope of physical and medical bases of biomeasurements and medical engineering to understand the methods and systems applied for measurements and diagnostics.

<div style="text-align:center">

Study outcomes and reference to the educational results for a field of study

</div>

Knowledge:

1. Ability to describe the application areas and potential of the modern measurement systems - [K_W11 +++]

2. Ability to explain the principles and techniques of the measurement signals acquisition and processing for the needs of current industrial and biomedical applications - [K_W11 ++ K_W12 +]

Skills:

1. Ability to design creatively the modern measurement systems, with the use of possibilities offered by available technologies, taking into account the limitations of present status of knowledge and technique - [K_U01 +]

2. Ability to work independently and as a team in the design and construction companies, research laboratories and industrial centers - [K_U05 +]

Social competencies:

1. Understanding a need of the broad populatrization of the knowledge in the area of simple and complex measurement systems used in industry and biomedical engineering - [K_K02 +]

<div style="text-align:center">

Assessment methods of study outcomes

</div>

Lectures:

- evaluation of the knowledge with a written exam related to the content of lectures (test, computational and problem questions),

- continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception).

Course description

- Biomeasurements and biomedical engineering: applications, classification, specificity, the state-of-the-art and tendency to development.

- Selected elements of physiology and anatomy.

- Thermodynamics of biological systems.

- Physical background of medical diagnostics.

- Modeling of biological processes.

- Influence of electromagnetic radiation on tissues; human organism protection from harmful factors.

- Medical applications of lasers and fiber optics technique.

- Biosensors and stents.

- Selected elements of bioinformatics ? metrological and technical aspects of recognition of DNA sequences.

- Selected questions of statistics and medical informatics.

- Clinical engineering. Ethics of procedures used in medical examinations.

Basic bibliography:

1. Biocybernetyka i Inżynieria Biomedyczna, red. Maciej Nałęcz, Akademicka Oficyna Wydawnicza Exit, Warszawa 2001-2003.

2. A. Cysewska-Sobusiak, Modelowanie i pomiary sygnałów biooptycznych, wyd. Politechniki Poznańskiej, Poznań 2001.

3. R. Tadeusiewicz, Informatyka medyczna, red. R. Tadeusiewicz, W. Wajs, Uczelniane Wyd. AGH, Kraków 1999.

4. G. Pawlicki, Podstawy inżynierii medycznej, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1997.

Additional bibliography:

1. K. Booth, S. Hill, Optoelektronika, WKŁ, Warszawa 2001.

2. W.Z. Traczyk, Fizjologia człowieka w zarysie, PZWL, Warszawa 1992.

3. J. Szabatin, Podstawy teorii sygnałów, wyd. 3, WKŁ, Warszawa 2000.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	18
2. Participation in consulting with the lecturer	5
3. Preparation to the exam	15
4. Participation in the exam	3

Student's workload

Source of workload	hours	ECTS
Total workload	41	2
Contact hours	26	1
Practical activities	0	0